LITTLE CONEWAGO CREEK BRIDGE
(Lincoln Highway, Bridge over Little Conewago Creek)
Pennsylvania Historic Bridges Recording Project - II
Spanning S. Branch of Conewago Creek at Lincoln Hwy. (U.S. Rt. 30)
New Oxford vic.
Adams County
Pennsylvania

HAER No. PA-486

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
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Washington, DC 20240

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HISTORIC AMERICAN ENGINEERING RECORD

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(Lincoln Highway, Bridge over Little Conewago Creek)

HAER No. PA-486

Location:	Spanning S. Branch of Conewago Creek at Lincoln Hwy. (U.S. 30), New Oxford vicinity, Adams County, Pennsylvania.
USGS Quadrangle:	McSherrystown, Pennsylvania (7.5-minute series, 1973).
UTM Coordinates:	18/322240/4414520
Dates of Construction:	1917-18; altered 1929.
Designer:	Charles A. Williams (Jacobus, Pennsylvania).
Builders:	George A. and Fred M. Wagman (Dallastown, Pennsylvania).
Present Owner:	Pennsylvania Department of Transportation.
Present Use:	Vehicular bridge.
Significance:	The Little Conewago Creek Bridge was constructed on the site of the first publicly funded bridge in Adams County (then part of York County). A series of structures at this location have aided commercial development, giving access to major market roads. The 1917-18 reinforced concrete structure bore the Lincoln Highway and was designed by Charles A. Williams, a local engineer who placed his distinctive imprint on bridges throughout York and Adams counties. Alterations by the Pennsylvania Department of Highways in 1929 reflect the state's growing role in highway maintenance.
Historian:	Haven Hawley, August 1998. Revised March 2001.
Project Description:	The Pennsylvania Historic Bridges Recording Project II was co-sponsored during the summer of 1998 by HABS/HAER under the general direction of E. Blaine Cliver, Chief; the Pennsylvania Department of Transportation, Bureau of Environmental Quality, Wayne W. Kober, Director; and the Pennsylvania Historical and Museum Commission, Brent D. Glass, Executive Director and State Historic Preservation Officer. The fieldwork, measured

drawings, historical reports and photographs were prepared under the direction of Eric DeLony, Chief of HAER.

Introduction

An unobtrusive reinforced concrete bridge spanning the South Branch of Conewago Creek (formerly known as Little Conewago or Conowago Creek) between New Oxford and Gettysburg stands as a reminder of how Pennsylvania's twentieth-century highways echo colonial mercantile byways. The site has been the subject of public interest as a stream crossing since the mid-eighteenth century. The area's market for agricultural and industrial goods included Baltimore as well as Philadelphia, making both north-south and east-west roads desirable for increasing sales of central Pennsylvania producers. A bridge across Little Conewago Creek has provided an east-west link since the colonial era. Division of York County in 1800 created Adams County, in which the bridge is now located. When Gettysburg became the seat of the new county, the bridge carried Black's Gap Road, keeping the Oxford (later New Oxford) vicinity connected to its faster-growing neighbor. The twentieth-century Lincoln Highway running between the two towns increased New Oxford's commerce, provided an impetus for constructing the present bridge, and added historic meaning to the long-used site.

Colonial Roads

The Little Conewago Creek Bridge carried Black's Gap Road, the second publicly funded route in York County. The first was the Monocacy Road, also known as the Great Wagon Road to Lancaster. By 1740, the Monocacy Road connected York to the Susquehanna River and to Maryland. Construction of the east-west Black's Gap Road resulted from two petitions in 1742, signed by people living along Marsh Creek in the area that became Gettysburg. The road came into use by 1747. Black's Gap Road became part of the Philadelphia-Pittsburgh Turnpike or Pennsylvania Road at the end of the Seven Years' War in 1763, linking both ends of the Commonwealth.[1]

The period after the war could not be described as peaceful, however. In the Proclamation of 1763, English authorities sought to restrict settlements to areas east of the Allegheny Mountains in order to keep peace with Native Americans. The proclamation proved hard to enforce, and illegal immigrants continued to claim lands near present-day Pittsburgh. York County lay just east of the frontier. Its residents engaged in uneasy relations with friendly tribes and outright hostilities with others angered by Anglo-European encroachment. Lawmakers

[1] Robert L. Bloom, *A History of Adams County, Pennsylvania, 1700-1990* (Gettysburg: Adams County Historical Society, 1992), 30, 31, 33.

in England feared not only continuing Indian warfare but also increasing conflict with colonists over tax policies, such as the stamp tax.[2]

After the Revolution, Pennsylvania encouraged interior transportation in the form of roads, which both agricultural and commercial interests supported. Political and military considerations recommended tying the outlying districts more closely to colonial leadership in Philadelphia, as did that city's economic competition with Baltimore. The Little Conewago Creek crossing's location aided in achieving these ends, to the benefit of colonial leaders as well as merchants and farmers.

Other early routes also crossed the Little Conewago Creek bridge, reflecting its importance to transportation in the region. A 1791 map of Pennsylvania records Nichol's (or Nicholson's) Gap Road, which followed Black's Gap from York, through Berwick, to approximately where Oxford would soon be established. The two roads diverged just west of Little Conewago Creek, with Black's Gap heading west to Chambersburg and Nichol's Gap continuing southwest through Gettysburg to a point near the Maryland border.[3] In 1795, York County's second post road was established, connecting York and Gettysburg by way of Abbottstown, with Black's Gap Road forming part of the route. The later Gettysburg and York Turnpike nearly duplicated the route of Black's Gap Road.[4] Present-day U.S. 30 follows Nichol's Gap Road from York to Gettysburg, reflecting the continued prominence of the route.

The Oxford Bridge

In 1767, York County constructed the first public bridge in present-day Adams County, across Little Conewago Creek near Oxford. The wooden structure was the only free bridge for residents until a second public bridge was erected at Gettysburg in 1797. The Oxford bridge served two pre-Revolutionary towns that have survived into the late twentieth century: Gettysburg, founded in 1786, and Oxford, founded in 1792 and renamed New Oxford in 1828. Both towns gained access to larger markets via the Little Conewago Creek crossing. Each

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[2] "Minutes of the Provincial Council of Pennsylvania," 1762-1771, *Pennsylvania Archives,* 1st ser., vol. 9 (Harrisburg: Theodore Fenn & Co., 1852; reprint, New York: Amos Press, 1968), 138, 298-99, 342-33, 403-04.

[3] Balthasar H. Meyer, Caroline E. MacGill, et al., *History of Transportation in the United States before 1860* ([New York]: P. Smith, 1948; reprint, Cambridge, Mass.: Murray Printing Co., n.d.), 50-51; and Reading Howell, "A Map of Pennsylvania, & the Parts connected therewith, relating to the Roads and inland Navigation especially as proposed to be improved by the late Proceedings of Assembly (Copied from his larger Map)...," in "Papers Relating to What is Known as the Whiskey Insurrection in Western Pennsylvania, 1794," *Pennsylvania Archives,* 2nd ser., vol. 4, edited by John B. Linn and William H. Egle (Harrisburg: Clarence M. Busch, 1896; reprint).

[4] Henry C. Bradsby, *1886 History of Adams County, Pennsylvania,* originally published as *History of Cumberland and Adams Counties* (Chicago: Warner, Beers & Co., 1886; reprint, Knightstown, Ind.: Bookmark, 1977), 55; Bloom, *History,* 30-32, 44. By 1800, a lesser-known north-south route called the Oxford Road also relied on the creek crossing; see Bloom, *History,* 33.

town's founder surveyed land into plots for sale and offered property in the town center as the seat of a new county that many anticipated to be carved out of York County. When the expected division took place in 1800, Gettysburg landed the prize. More centrally located than its competitor, Gettysburg also served as the meeting point of more roads. Five routes extended from Gettysburg, primarily in north-south directions but also including the east-west road through Oxford. Despite its advantageous location east of the Black's Gap-Nicholson's Gap junction, Oxford was a mile distant from the nearest north-south road.[5]

Although the county seat bypassed Oxford, the Little Conewago Creek Bridge remained an important feature of the area's local transportation system and was rebuilt accordingly. The first eighteenth-century wooden bridges commonly needed more permanent replacements such as stone structures or covered wooden bridges. Two major floods along the Conewago and its tributaries occurred in 1786 and 1826, with flood waters not surpassed until at least the 1880s.[6] Flooding may have contributed to the need to rebuild the 1767 structure. A drawing for the 1917 reinforced concrete structure, for instance, noted that the highest known flood stage at the bridge was ten feet above normal water level.[7] Another inducement to building a more solid crossing structure would have been the need to bolster east-west connections in the commonwealth in the aftermath of the Whiskey Rebellion in 1791. Internal transportation improvements came to be seen as an important part of controlling distant parts of the state while addressing genuine grievances expressed by the farmers.[8]

In 1798, the Little Conewago Creek Bridge was rebuilt in stone and continued to be a public structure. Stone bridges built around the turn of the century typically cost about $7,500 and obligated builders to maintain them for seven years. During that time, however, American bridge projects commonly featured wood rather than stone.[9] Thomas F. Gordon, in his 1832 *Gazetteer of the State of Pennsylvania,* ranked three Conewago Creek bridges among five York County structures that impressed him.[10] It is likely that the Little Conewago Creek crossing was

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[5] Bloom, *History,* 20, 34-35, 45, 52-53. See also Edward McPherson, *The Story of Adams County, Pennsylvania, and of the Selection of Gettysburg as Its Seat of Justice...* (Gettysburg: Historical Society of Adams County, 1889; reprint, Lancaster, Pa.: Inquirer Print, n.d.), available on microfilm, Genealogy Department, State Library of Pennsylvania, Harrisburg, Pa. Oxford was called Providence in the original grant to Henry Kuhn in 1792 but Oxford Town upon platting, according to Bradsby, *1886 History,* 324.

[6] Bradsby, *1886 History,* 324.

[7] Drawing No. B-3-1, Project No. 17, File 30075, Historical Society of York County, York, Pa. The organization changed its name to York County Heritage Trust, effective 1 Aug. 1999.

[8] "Papers Relating to What is Known as the Whiskey Insurrection," 1-15.

[9] Bloom, *History,* 118-20.

[10] Thomas F. Gordon, *A Gazetteer of the State of Pennsylvania* (Philadelphia: T. Belknap, 1832; reprint, New Orleans: Polyanthos, 1975), 3.

one of the three. Stone structures stood apart from the wood bridges that were more common in his day.

Nearby Structures

During the early nineteenth century, when water power fueled Pennsylvania's industry, the creek that passed beneath the bridge was equally important as the road that passed over it. George Golden owned the land on the east side of Little Conewago Creek and south of Black's Gap Road, which became the site of Diehl's Mill, the best-known structure located near the bridge. About 1810, George Kuhn acquired the first deed for the land from Golden. Kuhn built a mill two years later, then sold the property to Peter Diehl.[11]

The mill and land stayed in the Diehl family, passed down to Peter's son Daniel and then bought by his grandson, Joseph R. Diehl, in 1864.[12] Peter and Daniel Diehl at different times owned a grist mill and a saw mill in Berwick Township, since divided into Berwick, Hamilton, and New Oxford townships. Daniel turned the mills over to Peter shortly around 1802, but Peter returned ownership to Daniel shortly after purchasing the mill adjacent to the Little Conewago Creek Bridge.[13]

A fire completely destroyed the flour mill on 18 March 1858, consuming barrels of finished flour and 1,200 bushels of wheat and other grain waiting to be milled. The Diehls rebuilt the mill with a third story in 1859, then attached a saw mill in 1870. They built a new dam four years after the addition. The property also included an old house that had been a distillery. With an addition to the distillery, the structure became habitable and was used as dwelling.[14] Drawings of the 1917 bridge contain no mention of adjacent structures, but 1929 plans indicate that ruins of a stone mill lay east of the creek on land then owned by Harry Hoffman.[15] As of this writing, a wood-frame restaurant occupies the site, in a similar location and orientation as the mill, perhaps on the same foundation.

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[11] Typescript, 9 Mar. 1934, of article from *Gettysburg Compiler,* 18 May 1886, in Mill File, Adams County Historical Society, Gettysburg, Pa. (hereinafter cited as *Compiler* typescript). See Bradsby, *1886 History,* 492, for a genealogy of the Diehl family recording that the family's possession of the property goes back to 1801.

[12] *Compiler* typescript.

[13] "Diehl, Peter," and "Diehl, Daniel," from Card Catalog, Adams County Historical Society, Gettysburg, Pa.

[14] *Compiler* typescript.

[15] Pennsylvania Department of Highways, "Drawings for Construction of Route No. 126 in Adams County," sheet 16, Oct. 1929, from *Borough and Township Combinations Books,* Adams County Archives, Gettysburg, Pa. (hereinafter cited as Adams County, *Combinations Books*). The exact date of the mill's abandonment could not be located in research for this report.

The Turnpike Era

Funding of Pennsylvania's transportation infrastructure has passed through several phases. Early roads in the eighteenth century received local financing, and by the start of the nineteenth were maintained by road supervisors. Local residents paid taxes or provided labor to build byways that a township's road supervisor arranged to keep repaired.[16] The resulting roads often lacked systematic maintenance, but some public routes were repaired by this method until the automobile era, which required more skilled construction methods.[17] Around the turn of the nineteenth century, privately owned turnpikes and toll roads achieved popularity as an alternative means of paying for local transportation improvements while encouraging entrepreneurial activity. Both local and private ownership persisted into the twentieth century, when major routes were absorbed into a state-maintained system.

Turnpikes were the first wave of a transportation revolution made possible by a boom in private companies providing roads, canals, and railroads for the growing Republic. Using state permission to incorporate, transportation companies amassed the capital for large-scale projects from widespread investors.[18] Beginning in 1785, states authorized private companies to build and maintain roadways. The charters allowed companies to set a toll for passage in exchange for relieving residents and municipalities of levies for maintaining the roads. The Philadelphia and Lancaster Turnpike opened in 1794 and became the first truly profitable turnpike, encouraging private toll roads in other parts of the country. An 1807 report on internal improvements by Secretary of the Treasury Albert Gallatin gave information about turnpikes across the nation, aiding road boosters in their efforts to attract investors.[19] Pennsylvania sponsored turnpike projects to discourage trade from leaving the state, hoping to encourage east-west connections tying central Pennsylvania more firmly to Pittsburgh and Philadelphia markets. At least ten companies existed in Pennsylvania by 1815. By the start of the 1830s, 220 turnpike concessions operated up to 3,000 miles of road across the state.[20] Among these were ten roads forming the Philadelphia-Pittsburgh Turnpike or Pennsylvania Road, a state-sponsored link between the two cities.

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[16] Bloom, *History,* 118.

[17] Charles J. Singer et al., eds., *A History of Technology,* vol. 4, *The Industrial Revolution c. 1750 to c. 1850* (Oxford: Clarendon Press, 1958), 536.

[18] Bloom, *History,* 126.

[19] Meyer, *History of Transportation,* 63-64; George R. Taylor, *The Economic History of the United States,* vol. 4, *The Transportation Revolution, 1815-1860* (White Plains, N.Y.: M. E. Sharpe, Inc., 1951), 16-18; and Frederic J. Wood, *The Turnpikes of New England and Evolution of the Same through England, Virginia, and Maryland* (Boston: Marshall Jones, 1919), 7, 14.

[20] Bradsby, *1886 History,* 55; and Bloom, *History,* 122-23. Taylor, *Transportation Revolution,* 23, records the number of turnpike miles in 1832 as 2,400, however.

The turnpike craze hit Adams County soon after its founding in 1800. The Gettysburg and Petersburg Turnpike (chartered 1807), Gettysburg and Black's Tavern Turnpike (1811), and several other short routes began in the first two decades of the century. On 11 March 1815, the Pennsylvania Assembly approved the incorporation of a company "to make an artificial road by the nearest and best route from the west end of the Borough of York to the Borough of Gettysburg in the County of Adams."[21] The Gettysburg-York route used the existing Black's Gap Road, but placed authority for maintaining the road in private hands, a company known as the Gettysburg and York Turnpike. The venture continued the work of the shorter York and Susquehanna Turnpike, approved in 1804, which maintained a road from Wrights Ferry to York. By 1819, the Gettysburg and York Turnpike had extended the toll road to Gettysburg, with two toll gates in each of Adams and York counties. The road included 28 route miles and cost almost $108,000.[22] Unlike other Pennsylvania counties where plank or "corduroy" roads were common, Adams County roads during the mid-nineteenth century featured durable macadam construction, following a precedent set by the Lancaster Pike's pioneering use of that technology.[23]

Despite the profitable operations of a few notable turnpikes and state financial assistance, most toll roads failed to make money. Owners often refused to invest their skimpy profits into maintenance, allowing many roadways to deteriorate.[24] Turnpikes provided efficient transportation for short distances as desired by most travelers, but carrying bulky freight longer distances proved costly. In Pennsylvania, many turnpikes focused on east-west transportation, but the roads formed a mish-mash of routes serving local rather than state-wide traffic.[25] The combination of overbuilding routes, and to a lesser degree competition from canals and railroads, led to widespread abandonment of turnpikes in the 1820s. The few companies that existed after 1830 were generally the most profitable and best maintained.[26] An 1872 atlas of Adams County showed the York and Gettysburg Turnpike between the two cities, and the moniker "York Pike" appeared on a 1906-08 U.S. Geologic Survey map of the area. Although the turnpike company could have existed until the Pennsylvania Department of Highways acquired the roadway in

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[21] "Executive Minutes, 1814-1818," *Pennsylvania Archives*, 9th ser., vol. 6, edited by Gertrude MacKinney ([Harrisburg]: Bureau of Publications, 1931), 4260.

[22] Bradsby, *1886 History*, 55-56, 322.

[23] U.S. Bureau of Public Roads and Pennsylvania Department of Highways, *Report of a Survey of Transportation on the State Highways of Pennsylvania* (n.p.: U.S. Bureau of Public Roads and Pennsylvania Department of Highways, 1928), 35.

[24] U.S. Bureau of Public Roads, *Report*, 35.

[25] Bloom, *History*, 123.

[26] Brian A. Butko, *A Pennsylvania Traveler's Guide to the Lincoln Highway* (Mechanicsburg, Pa.: Stackpole Books, 1996), xxv; Taylor, *Transportation Revolution*, 26-28.

1911, the exact date on which the company ceased operations could not be determined in researching this report.[27]

As turnpike companies failed to turn profits, they simply abandoned the chartered roadways, and local governments began taking over the projects. Increasingly under local ownership in the latter decades of the nineteenth century, the roadways fared no better in terms of maintenance — and in some cases worse. A 1928 Department of Highways report author remarks that Pennsylvanians quipped that a dirt road was better than a turnpike — the dirt road being impossible to travel over for half a year, while a turnpike was in bad condition year 'round.[28]

State Funding

Established in 1903 to bring order to the state's roadways, the Pennsylvania Department of Highways received the charge of aiding local governments in repair efforts. The department initially assisted rural townships, bearing two-thirds of the cost, without creating a centralized system. Telford macadam comprised the majority of new pavement, but a smaller number of roads were brick, concrete, or bituminous penetration macadam. In 1905, the state funding share increased to 75 percent, with more flexible reimbursement procedures. The 1911 Sproul Act finally authorized a fully funded state highway system encompassing approximately 8,000 miles of roads, but decreased assistance for local roads to 50 percent.[29] The roadway carried by the Little Conewago Creek Bridge became State Route 1 under the Sproul Act, although Adams County retained responsibility for the bridge itself.[30]

Designation of the Lincoln Highway gave New Oxford, among other small towns through which it passed, a greater chance at state funding. The increase in tourists driving on the Lincoln Highway added pressure for improvements, as did the growing number of automobiles owned by Adams County residents. Initiated by automobile boosters and supported by business owners along the route, the Lincoln Highway Association revived the idea of a memorial roadway honoring Abraham Lincoln. This was an outgrowth of the Good Roads movement, begun by bicycle enthusiasts in the late nineteenth century, and given greater impetus by automobile traffic

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[27] Bloom, *History,* 127; D. J. Lake, *Atlas of Adams County, Pennsylvania* (Philadelphia: I. W. Field & Co., 1872), 51, Oxford plate; U.S. Geological Survey, topographic map of Adams County (1906-08; reprint, 1929), in possession of Adams County Historical Society, Gettysburg, Pa. Elwood W. Christ, Assistant Archivist, Adams County Historical Society, aided in locating these maps as well as the typescript about Diehl's mill.

[28] U.S. Bureau of Public Roads, *Report,* 35-36.

[29] Butko, *Traveler's Guide,* 27; U.S. Bureau of Public Roads, *Report,* 37.

[30] Straight-Line Diagrams, Engineering District 8-0, Pennsylvania Department of Transportation, Harrisburg, Pa.

in the twentieth. Although an original proposal to link the nation's capitol to Gettysburg failed, Congress designated a coast-to-coast route in 1913.[31]

Like the turnpikes, the Lincoln Highway used many existing roadways and bridges to complete its path. The Lincoln Highway Association chose a Pennsylvania route specifically to allow travelers to pass through Gettysburg. Across the state, the highway followed the old Pennsylvania Road, except to pass through York on the way to Gettysburg.[32] This bypassed Harrisburg, which was considered too northerly a route. Instead, the Adams County portion of the Lincoln Highway followed the former York and Gettysburg Turnpike Company road.

Local governments purchased toll roads from private companies to free roads for the Lincoln Highway, resulting in a free roadway across the nation. The Pennsylvania Department of Highways used formulas of remuneration to assist local governments in maintaining and improving former turnpike roads in the state. The final segments of toll road bought from private companies in Adams County were negotiated using post-Sproul Act funding schemes. By 1918, all toll roads along the route had been brought into the public domain.[33]

Designers and Builders

Because the Little Conewago Creek Bridge remained a county-owned bridge, it was the Adams County Commissioners who voted in 1917 to rebuild the crossing. They chose a local designer and construction company for the task. Charles A. Williams, an engineer from Jacobus in York County, prepared drawings for the new bridge.[34] On 12 June 1917, the commissioners awarded the construction contract to G. A. and F. M. Wagman, contractors based in Dallastown, also York County. Their bid of $9,200 was the lowest among five bidders on Williams' plans; a lower sixth bid on an alternate design was rejected.[35] The Wagman company was owned by George A. and Fred M. Wagman, who advertised as contractors in a 1923 York city directory.

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[31] U.S. Bureau of Public Roads, *Report,* 36. For two sources about the Lincoln Highway, see Robert Bruce, *The Lincoln Highway in Pennsylvania: Old Philadelphia-Pittsburgh Pike, or Pennsylvania State Road, Incorporating the Lancaster Turnpike...* (Washington, D.C.: American Automobile Association, 1920); and Lincoln Highway Association, *The Lincoln Highway: The Story of a Crusade that Made Transportation History* (New York: Dodd, Mead & Co., 1935).

[32] Bruce, *Lincoln Highway,* xxiv.

[33] Butko, *Traveler's Guide,* xxvi-xxvii.

[34] Charles A. Williams, "Reinforced Concrete Arch Bridge on Lincoln Highway between New Oxford and Gettysburg, Adams County, Penna.," n.d., in Adams County, *Combinations Books.* Also included in the books are Pennsylvania Department of Highways standard specifications for bridges, concrete reinforcement, concrete mixing, and other work, dating from about 1919 to 1930 — roughly the same time period as Williams' work. Many highway projects appear to have been standardized around 1924.

[35] Adams County, *County Commissioners' Minutes,* 17 June 1917, MS Group 1: Minutes of the County Commissioners, Adams County Archives, Gettysburg, Pa.

While Fred's sole occupation was that of contractor, the directory also listed George as a vice president of the Union State Bank, undoubtedly a position that added to the firm's standing in the community, if not enhanced the financial position of the contracting partnership.[36]

A York County native, Williams received his education from the York County Institute, a one-room school that later became the York Collegiate Institute. In addition to working as a surveyor for York County, he held positions as a teacher, salesman, and partner in the Wagman firm. He designed and built residential, commercial, and public buildings in the area, as well as bridges for York County and the Pennsylvania Railroad. He continued residential contracting work and held the position of justice of the peace in Jacobus after he left the Wagman firm in about 1929.[37]

Williams' bridge work ranged from designing concrete arches to retrofitting a wooden covered bridge with a steel Pratt truss. At least three of Williams' designs for Adams County bridges built between 1915 and 1920 remain in the Adams County Archives, but the larger portion of his work exists in the Historical Society of York County's collections. Williams' drawings typically lack directional notation and uniformly lack dates except when he included a stone marker for the project. The Little Conewago Creek Bridge had no such marker, although secondary sources indicate that it was completed in 1918.[38] Williams produced at least seventeen designs that still exist, mostly concrete arches in a style similar to the Little Conewago Creek Bridge. For one notable but undated design built by the Wagman firm, he prepared drawings of a three-span structure measuring 120'-0" per span. He used a modified Howe truss for structures at Royersford and Spring City, specifying steel cylinders filled with boulder concrete for the piers. Williams also designed numerous buildings, including schools, churches, a foundry, a hotel, and the Adams County jail. One drawing included in the York archive was for the Dallastown residence of Fred M. Wagman.[39]

Williams' bridge designs differ from those of state-funded bridges during the same period. His trademark style of triangular-stemmed capital lettering sets his drawings apart visually. State specifications accompany work signed by other engineers in Adams County records, but Williams' drawings generally omit quantities or grading information. Several

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[36] R. L. Polk & Co., *Polk's York County and City Directory,* vol. 14, *1923-24* (New York: R. L. Polk & Co., 1923), 1186.

[37] "Life History of Charles A. Williams," File 30075, Historical Society of York County, York, Pa.

[38] Bruce, *History,* 58-59.

[39] Project No. 17, File 30075, Historical Society of York County, York, Pa. The York County collection holds more promise as a resource than the Adams County Archives. Although the Adams County drawings have been bound into books, they are not catalogued. Most other non-Civil War and non-genealogical records prior to 1934 no longer exist, according to Ed Roach, Historian, Adams County Archives, Gettysburg, Pa. The only document group other than drawings that contain information about construction projects before 1934 is the County Commissioners' Minutes, which date from 1841. Roach, interview by author, 23 July 1998.

drawings located at the Historical Society of York County contain details such as concrete reinforcement, but they lack the uniform bills of materials that began appearing in state-funded project plans of the late 1910s and early 1920s. The larger York County collection also shows that Williams at one point used all 3/4" square twisted bars in a symmetrical grid across the roadway, but later moved to using structural steel shapes for sidewall reinforcement and square twisted bars ranging in size from 1/2" to 1".[40]

The Little Conewago Creek Bridge

Williams' design called for two 50'-0" reinforced concrete arch spans, separated by an 8'-0" pier, with 50'-0" approaches on either side. The approaches narrowed from 32'-0" to the 23'-0" width of the bridge itself. A macadam roadway with a thin layer of waterproofing sandwiched between the macadam and concrete provided a durable road surface, averaging about 10" deep throughout the structure. Cold-formed expansion joints connected the two spans at the center and spans to each approach, and cast iron drains at the crown carried water away from both the roadway and the expansion joints.

The original concrete parapet walls, removed during a 1929 widening, were 1'-6" thick, extending upward 2'-6" from either side of the roadway. Beveled rectangular panels cut into both faces provided minor decorative relief. The abutment wing walls, also removed in 1929, extended 19'-6" below the roadway and were battered inward from 1'-6" at the widest visible portion to 3'-0" at the base. Boulder concrete thrust blocks at either end, 14'-0" thick at their base, support the arches and retain the earthen fill of the approaches. These were widened in 1929, as was the mid-span pier. The pier originally had a semi-circular nosing on its upstream face only, with a rectangular downstream face projecting only slightly beyond the parapet wall. Both faces now have semi-circular nosings. The arch rings are multi-centered, echoing familiar stone arch forms with sharp curvatures at either end of the barrel.

Williams' plans also shed light on the previous structure. A drawing of flood stages at the proposed bridge depicts a three-span hump-backed stone arch with spans of 20'-0", 25'-0", and 20'-0". The roadway had a crown elevation fully 5'-0" higher than the 1917 bridge. Williams specified a rise of 2'-6" beginning on the approaches, which significantly reduced the grade. The former bridge was most likely the same stone arch constructed in the late eighteenth century, considering its steep grade and short span lengths.[41] Williams also altered the creek channel, instructing that the old stone piers be removed and wider channels excavated, presumably to reduce the risk of flood damage. This appears to have been successful, for bridge

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[40] Adams County, *Combinations Books*; Project No. 17, File 30075, Historical Society of York County, York, Pa.

[41] Drawing No. B-5-1, Project No. 17, File 30075, Historical Society of York County, York, Pa.

inspection reports comment only on an occasional need to remove debris trapped against the pier.[42]

The author of a 1916 treatise on artistic bridge design noted that bridges in rural areas more often fit into their surroundings than those constructed in cities. This observation pithily sums up Williams' effort to render traditional stone forms in a reinforced concrete structure without giving in to the impulse to mold the latter material into an exact replica of the former. Williams followed many tenets of professional concrete design during this period, using subtle relief panels of varying depth to create the impression of an arch ring. Heavy abutments and a springing line appropriate to the river's height provided visual strength.[43]

Unfortunately Williams' original surface treatment has been lost beneath a subsequent alteration to the bridge. In response to growing automobile traffic, Congress agreed to help maintain a series of interstate routes with the Federal-Aid Road Act of 1916. The Lincoln Highway, designated U.S. Route 30 in 1926, became eligible for federal matching funds. Pennsylvania used federal aid to widen portions of the Lincoln Highway during the 1920s, choosing a three-lane design in the New Oxford vicinity. A 1929 law authorized state acquisition of county-owned bridges on state routes, allowing the Pennsylvania Department of Highways to proceed with widening across Little Conewago Creek.[44]

In order to accommodate the three-lane highway, the Department of Highways widened the Little Conewago Creek Bridge. Plans prepared by the department's Bridge Division reflect a shift toward centralized operations and increased standardization of structures on state highways. The drawings show a 17'-2" extension on the south side, and an 8'-10" extension on the north. The intrados profile follows Williams' original three-centered design, with a main radius of 60'-0" eased by 3'-5" fillets at either end. The arch ring extensions are 1'-2" thick at the crown, with an extrados radius of 82'-0", which is similar if not identical to Williams' original design. Reinforcement consists of longitudinal 1"-diameter steel bars following the curves of intrados and extrados and transverse 1/2"-diameter steel bars on 2'-0" centers, tied together by No. 4 gauge iron wire. A reinforced concrete balustrade, 1'-2" thick and 3'-6" tall, is based on Department of Highways standards.[45] Although the highway has since been reduced to two lanes with shoulders, the bridge maintains its 1929 appearance.

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[42] Bridge inspection file, BMS No. 01-0030-0450-0687, Pennsylvania Department of Transportation, Engineering District 8-0, Harrisburg, Pa.; see especially 13 Mar. 1997 report.

[43] William J. Titus, "The Artistic Design of Concrete Bridges," in *Reinforced Concrete Construction*, vol. 3, *Bridges and Culverts*, by George A. Hool and Frank C. Thiessen (New York: McGraw-Hill, 1916), 493-527.

[44] Pennsylvania, Public Law 1054 (1929).

[45] Pennsylvania Department of Highways, Bridge Division, "Reinforced Concrete Arch, 2-50'-0" Spans, Extensions R & L, Route 126, Sta. 466+84, Adams Co.," 2 sheets, 27 July 1929, in Adams County, *Combinations Books*.

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